Trade

Dave Donaldson, MIT

Trade and Development

- **Historically, Trade was a core topic in the field of Development**
  - Bauer, Hirschman, Lewis, Myrdal, Nurske, Prebisch, Rosenstein-Rodan…
  - Modern pioneers: Anderson, Bardhan, Bhagwati, Chenery, Corden, Dixit, Harrison, Hertel, Levinsohn, Little, Krueger, Krugman, Martin, de Melo, Panagariya, Rodriguez-Clare, S. Robinson, Rodrik, Srinivansan, Tybout, Venables, Westphal, Winters, Wood, + many more

- **Yet enduring controversies**
  - Ebb and flow of opinions about “export-oriented” vs “import-substitution” strategies
  - Anti-globalization protests in Seattle (1999), etc.

- **Last 30 years: empirical revolution – but themes often relatively macro/GE**
  - Major concern about SUTVA violations across units
  - Use of “theory lite” to extrapolate from natural experiments (surveyed in Donaldson, 2022)

3 areas of rapid progress in past 20 years

1. **Broadening of what we mean by “Trade”**

2. **Effects of Trade on aggregate income**

3. **Effects of Trade on inequality**

3 areas of rapid progress in past 20 years

1. **Broadening of what we mean by “Trade”**
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enagas
MAERSK
CMA CGM
ONE
Hapag-Lloyd
HMM
Evergreen
Yang Ming
ZIM
Wanhai
SITC
Sinotrans
COSCO
Cosco
Seaboard Marine
Crowley
Matson
Pasha
Foss
Ocean Network Express
Maersk
Sealand
Safmarine
Seago
Sudamericana
Hamburg Süd
Alianca
Mercosul
Transportes Navieros
Grupo Operador
Grupo Logistico
Grupo Transportes
Grupo Naviero
Grupo Portuario
Grupo Marítimo
Grupo Comercial
Grupo Industrial
Grupo Financiero
Grupo Inversor
Grupo Empresarial
Grupo Corporativo
Grupo Internacional
Grupo Nacional
Grupo Regional
Grupo Local
Grupo Global
Grupo Mundial
Grupo Universal
Grupo Continental
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Crest
Seaboard Marine
Crowley
Matson
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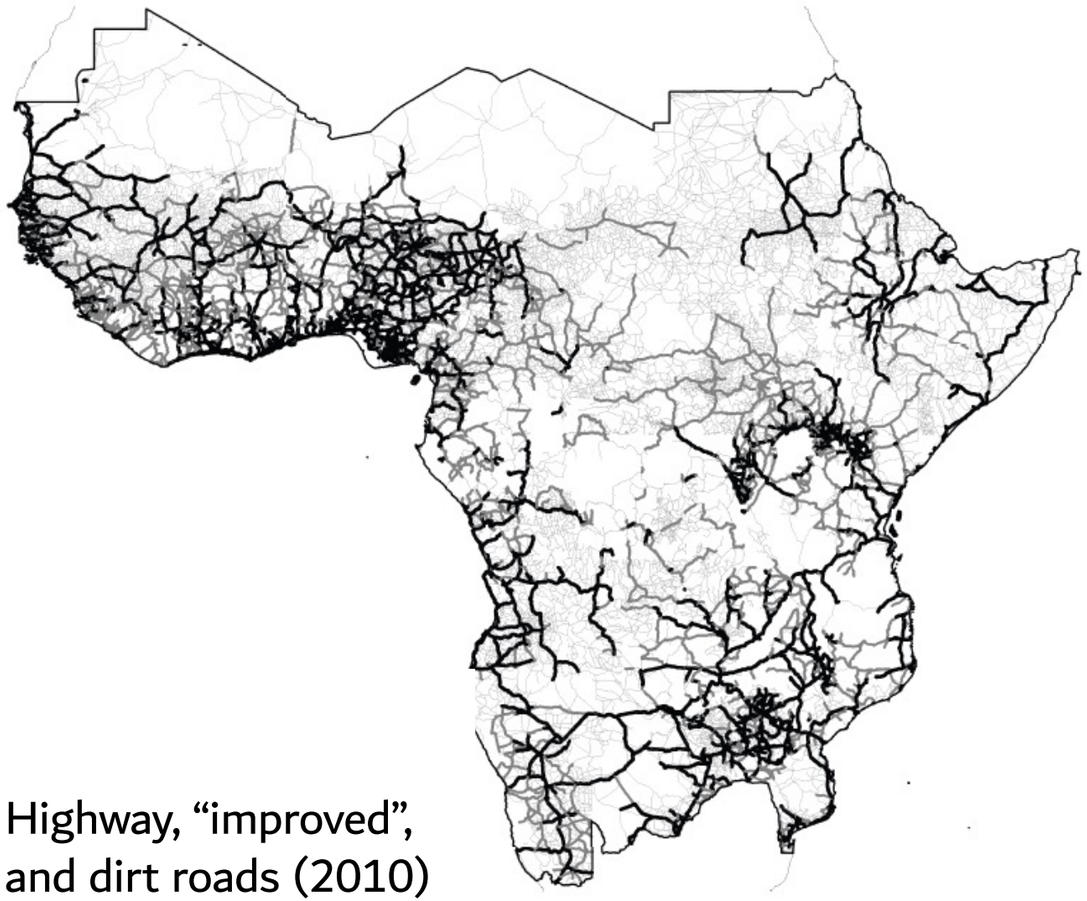
Grupo Empresarial
Grupo Corporativo
Grupo Internacional
Grupo Nacional
Grupo Regional
Grupo Local
Grupo Global
Grupo Mundial
Grupo Universal
Grupo Continental

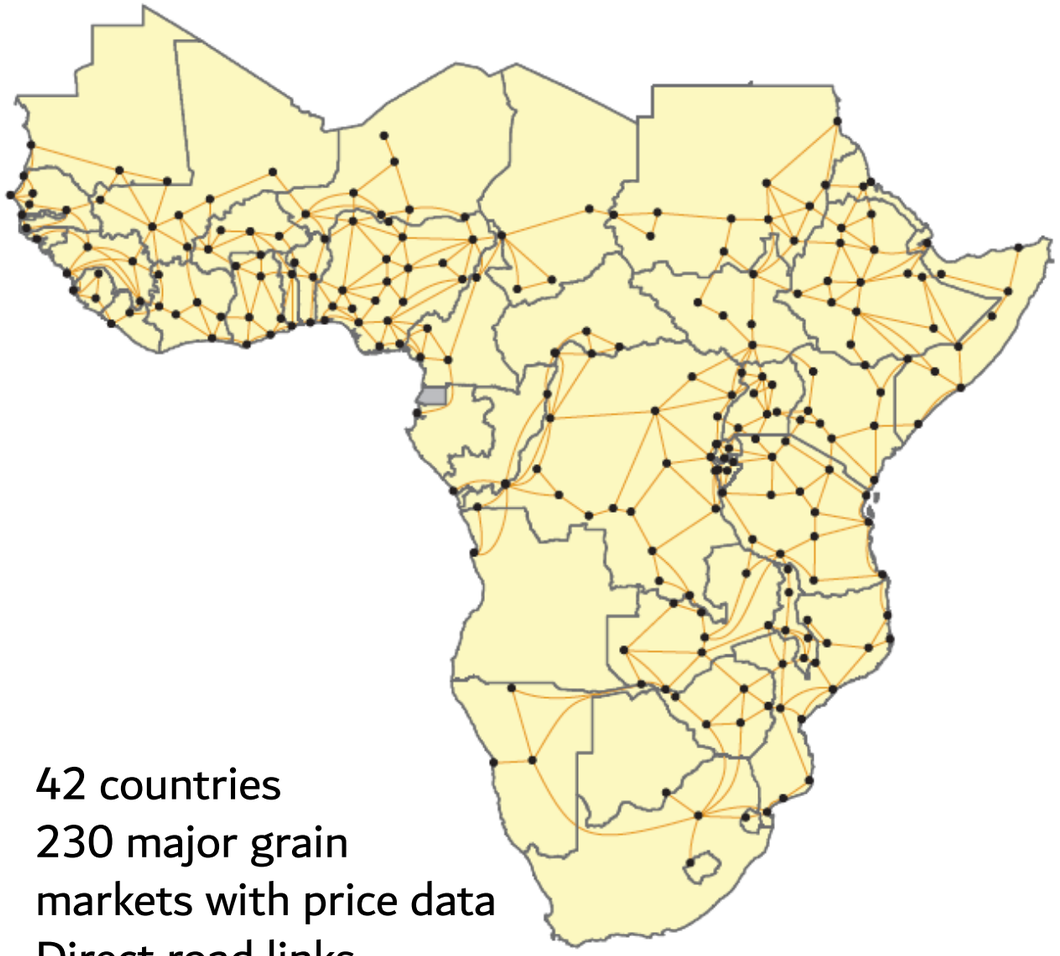
Broadening what we mean by “Trade”

Jedwab and Storeygard (2022)



Highway, “improved”, and dirt roads (2010)

Porteus (2019)



- 42 countries
- 230 major grain markets with price data
- Direct road links

The vision of Bertil Ohlin

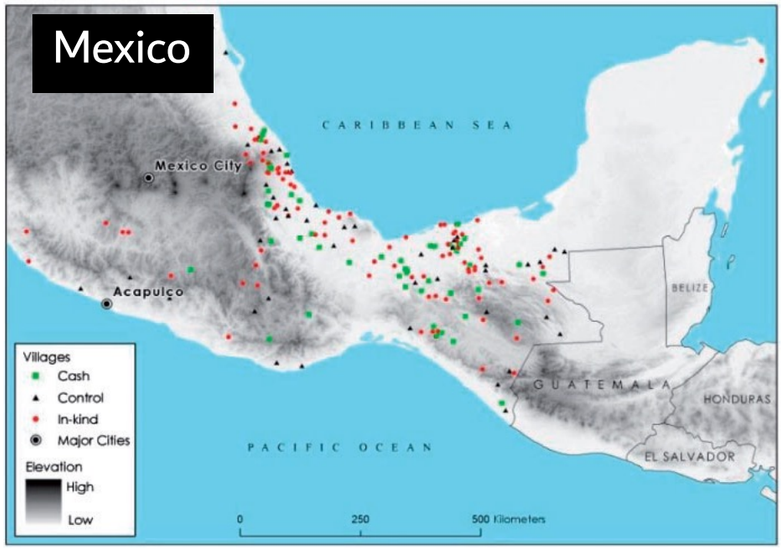
- Ohlin's seminal 1933 book was titled *Interregional and International Trade*
  - (Henderson, Isard, Krugman, Rossi-Hansberg, Venables)

- Inter- and intra-national trade as one integrated whole
  - Trade doesn't stop or start at the border
  - Strongest form of "globalization" may have taken place within countries – and may still not have happened much in parts of low-income countries

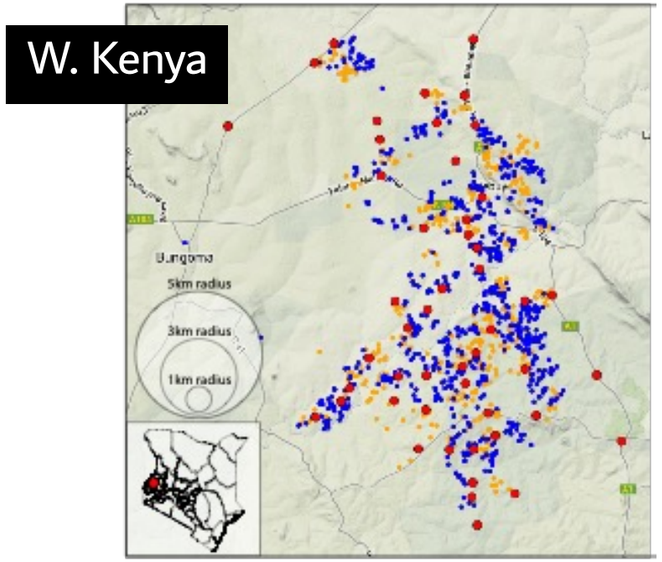
- New data sources have made this vision empirically possible
  - Data on intra-national trade was almost non-existent 20 years ago
    - VAT/GST microdata now in 10+ developing countries
    - Growing access to payments microdata
  - Explosion of other geo-coded data too

How open are sub-national economies?

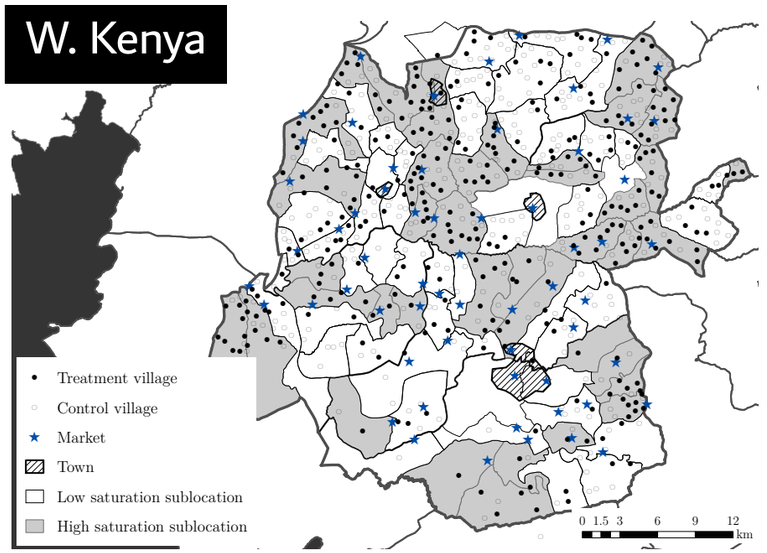
Cunha, de Giorgi & Jayachandran (2019)



Burke, Bergquist & Miguel (2019)



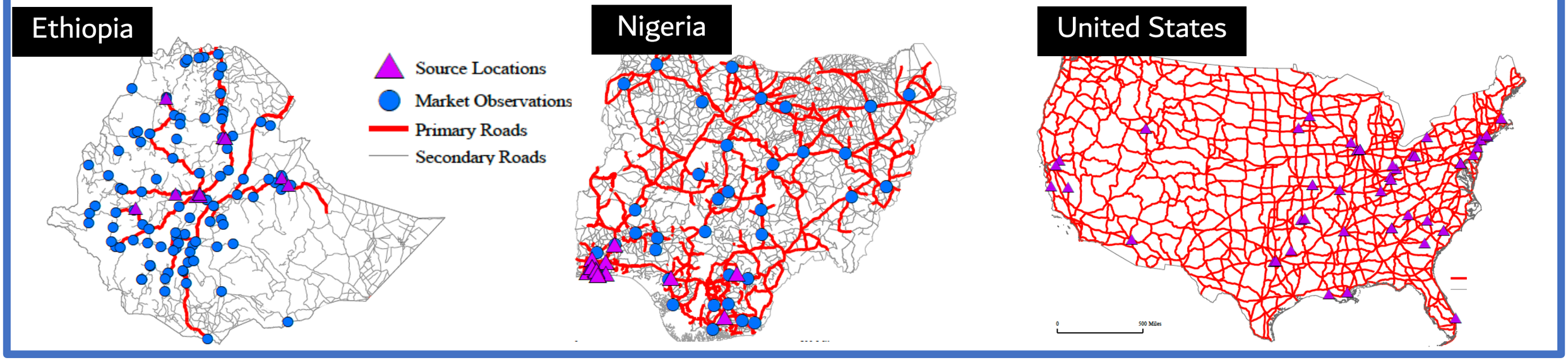
Egger, Haushofer, Miguel, Niehaus & Walker (2022)



- Large local price effects of supply interventions (and smaller effects of cash transfers), especially in remote locations
- Burke et al (2019): effect is 83% of size expected in autarky

How large are intra-national trade costs?

Atkin and Donaldson (2015)



- Method: relies on arbitrage argument, adjusted for effects of imperfect competition in each location (revealed by separate pass-through estimates)

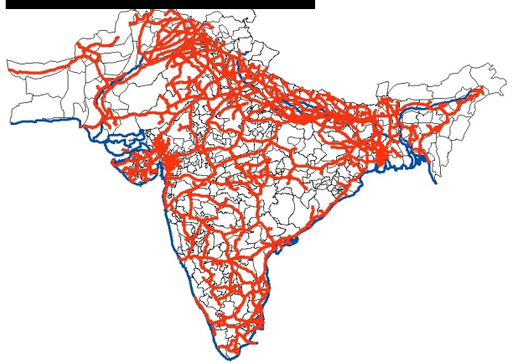
$$P_d - P_o = (\text{Trade Cost})_{od} + (\text{Markup})_{od}$$

- Finding: for average 500 km trip, trade cost in Ethiopia/Nigeria 5-12x higher than US for consumer goods in CPI

What are the effects of reducing trade costs?

Donaldson (2018)

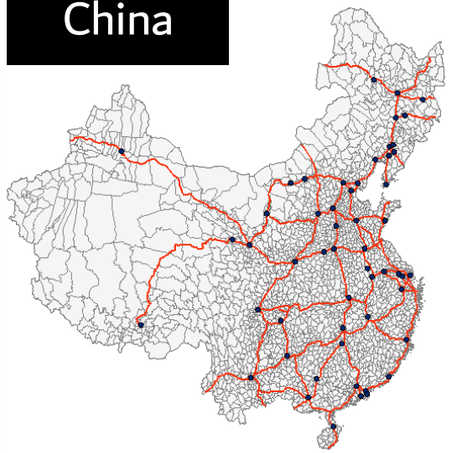
Colonial India



- Rail
- Increase in ag. GDP by 18%

Faber (2014)

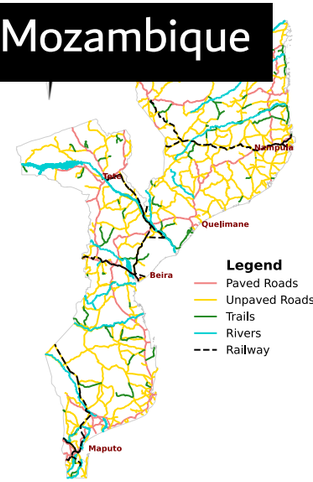
China



- Trunk highways (1990s)
- Decrease p.c. GDP by 15% among peripheral counties

Chiovelli, Michalopoulos & Papaioannou (2020)

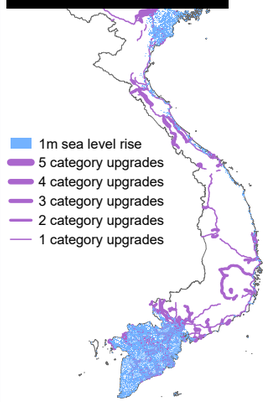
Mozambique



- Landmine clearing
- Most of effect of clearing due to road connectivity, not "direct" effect

Balboni (2020)

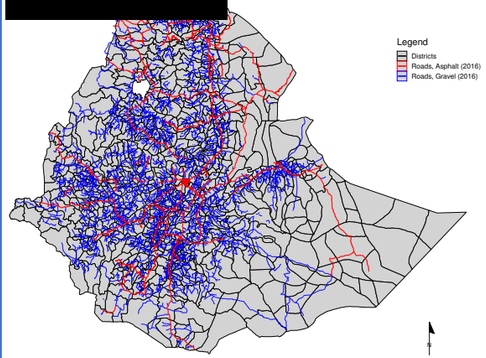
Vietnam



- Highway upgrades
- Increase GDP by 2%, but built on floodplain

Moneke (2021)

Ethiopia



- Road paving
- Increase GDP, + more when mixed w. elec. grid expansion

Morten and Oliveira (2024)

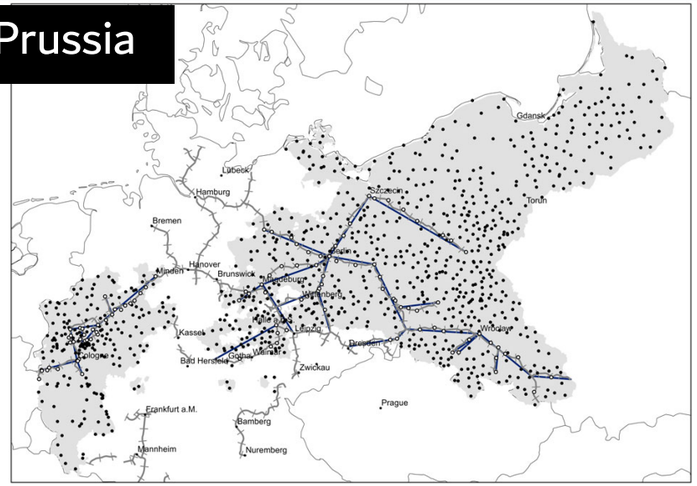
Brazil

- Radial highways
- Increase "welfare" by 3%, mostly due to trade rather than migration

More effects of reducing trade costs: rail networks

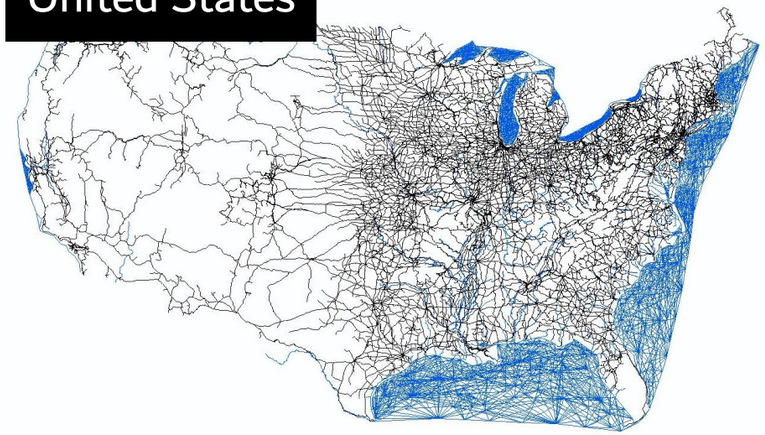
Hornung (2015)

Prussia



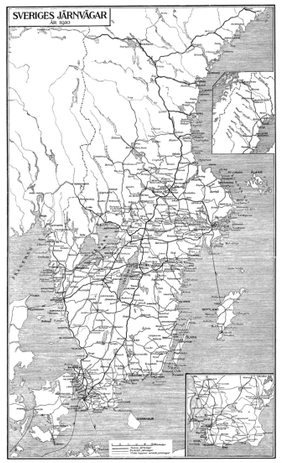
Donaldson and Hornbeck (2016)

United States



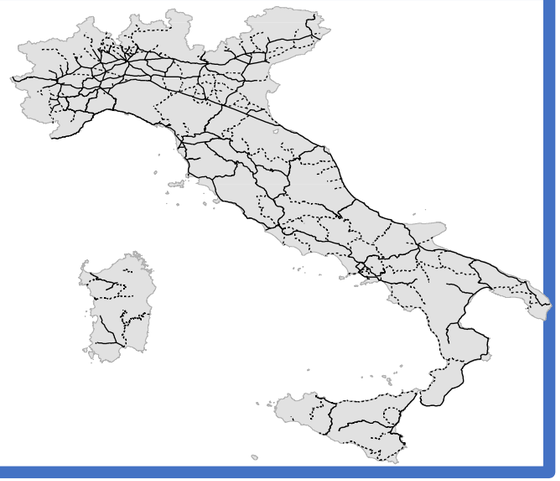
Lindgren, Petterson-Lidbom & Tyrefors (2021)

Sweden



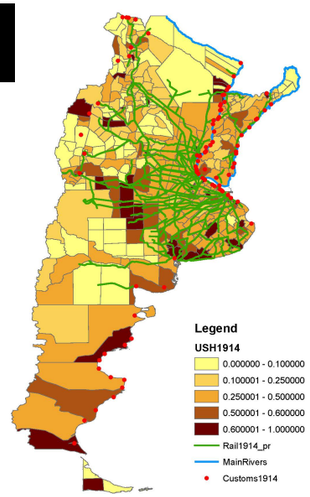
Bonfatti, Facchini, Tarasov, Tedeschi & Testa (2021)

Italy



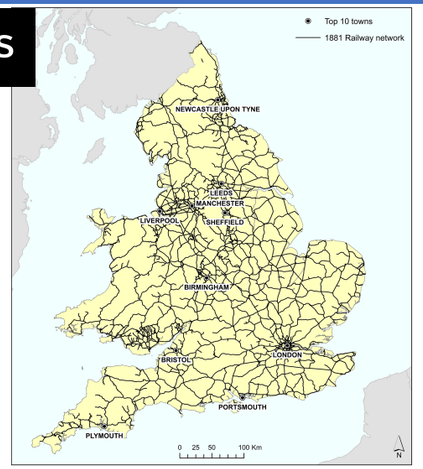
Fajgelbaum & Redding (2022)

Argentina



Bogart, You, Alvarez-Palau, Satchell & Shaw-Taylor (2022)

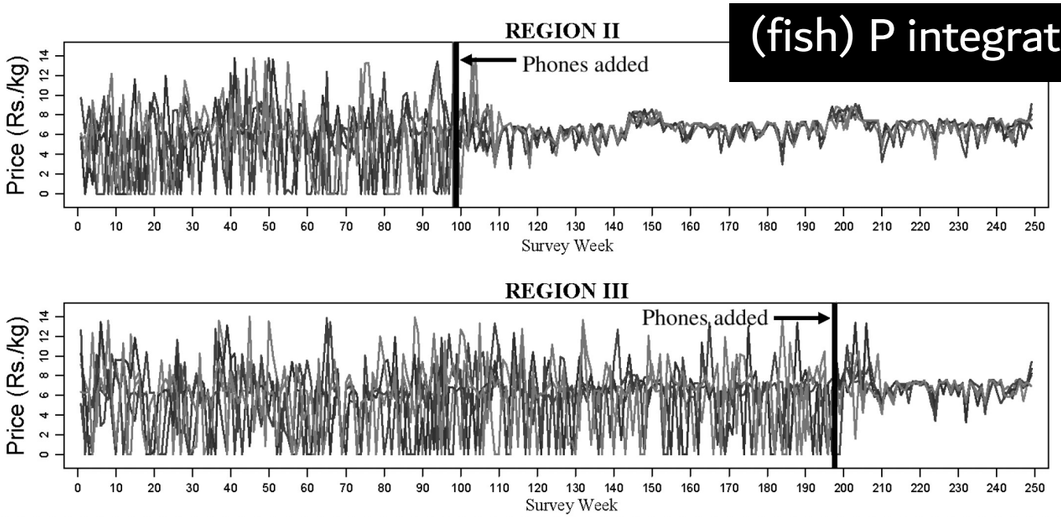
England & Wales



Other effects of domestic market integration

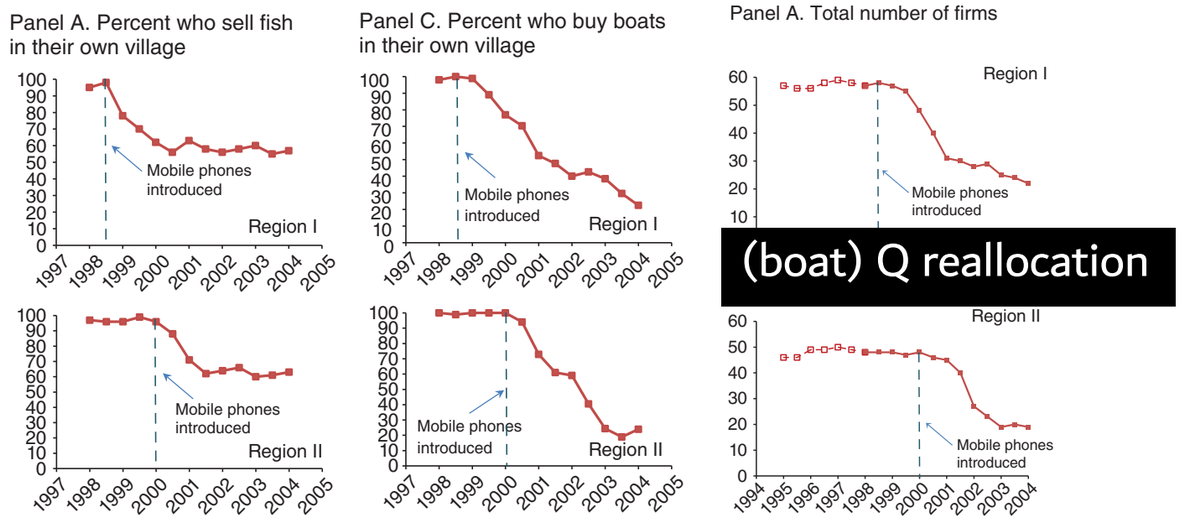
Jensen (2007)

(fish) P integration…



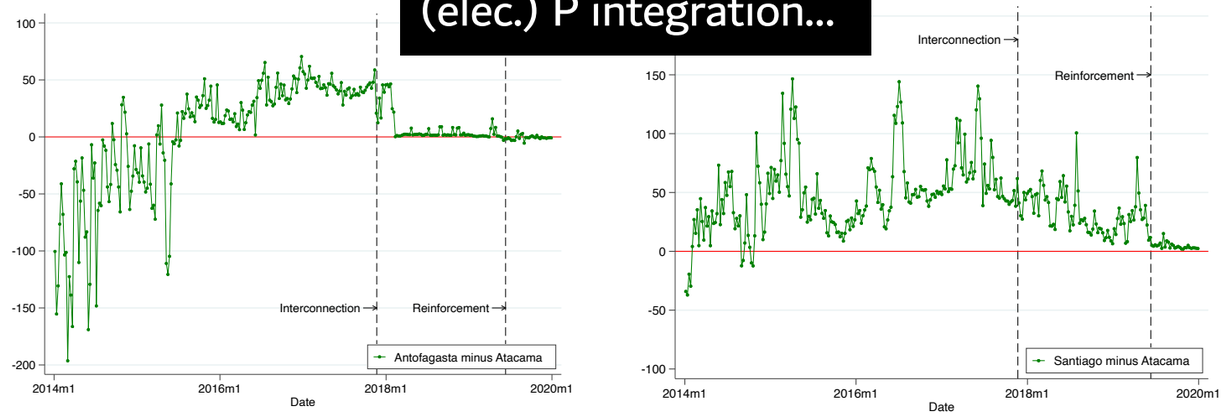
Jensen and Miller (2018)

(boat) Q reallocation

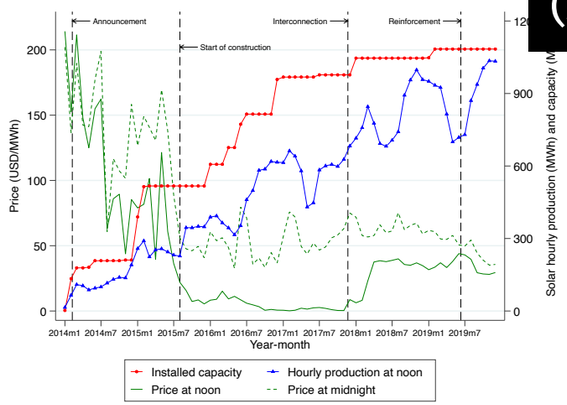


Gonzales, Ito & Reguant (2023)

(elec.) P integration…



(solar) Q reallocation



Some implications of large intra-national trade costs

- **Raises question of "who's getting globalized?"**
  - Atkin & Donaldson (2015): remote locations pay more for (and get less access to) imports
  - Cosar & Fajgelbaum (2016): coastal development in China as a result of trade

- **Methodology of program evaluation**
  - Challenges: trade means that SUTVA violations are everywhere (and sometimes the whole point)
  - Opportunities: In general class of trade models, "Market Access" measure (a la Redding and Venables, 2004) is correct proxy for treatment intensity (Donaldson & Hornbeck, 2016)

- **"Demand constraints" on devpt. may be even worse than you think**
  - Demand and big push: e.g. Goldberg and Reed (2023)
  - Market access constraints and low-quality equilib.: e.g. Bold, Ghisolfi, Nsonzi & Svensson (2022)
  - Lack of competition: e.g. Bergquist & Dinerstein (2020), Beirne & Kirchberger (2023)

- **Integration with other fields where intra-national spatial frictions are core**
  - Capital mobility (e.g. Bustos, Garber & Ponticelli, 2020)
  - Labor mobility (see Migration session)
  - Urban economics (survey in e.g. Bryan, Glaeser & Tsivanidis, 2020)
  - Reflects work and vision summarized in Townsend's 2012 Nobel symposium lecture

3 areas of rapid progress in past 20 years

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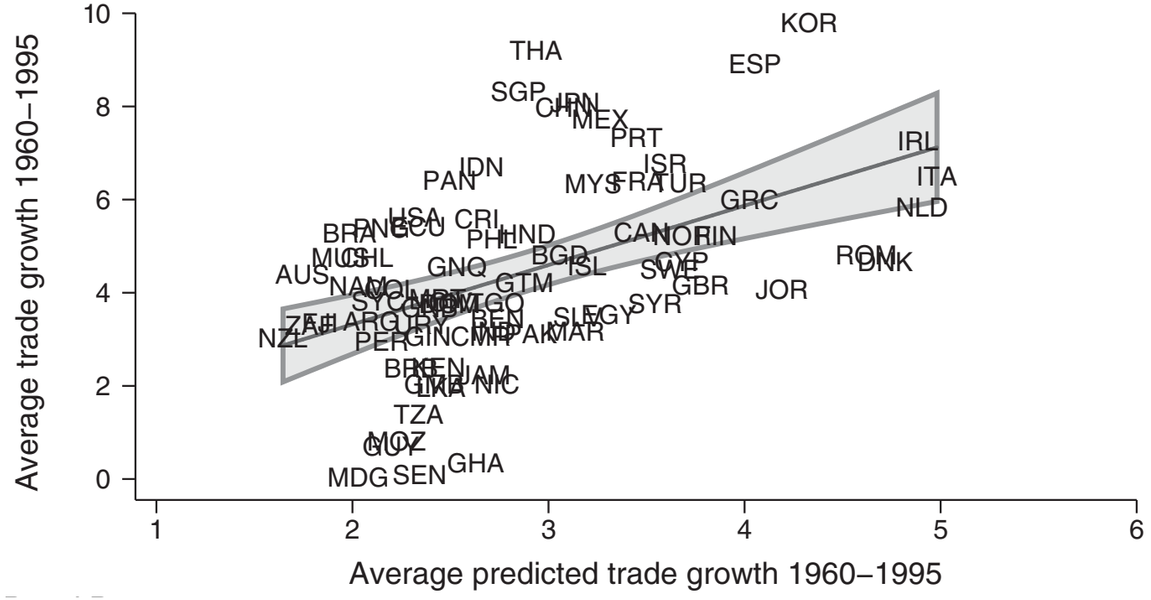
Effects of Trade on aggregate incomes

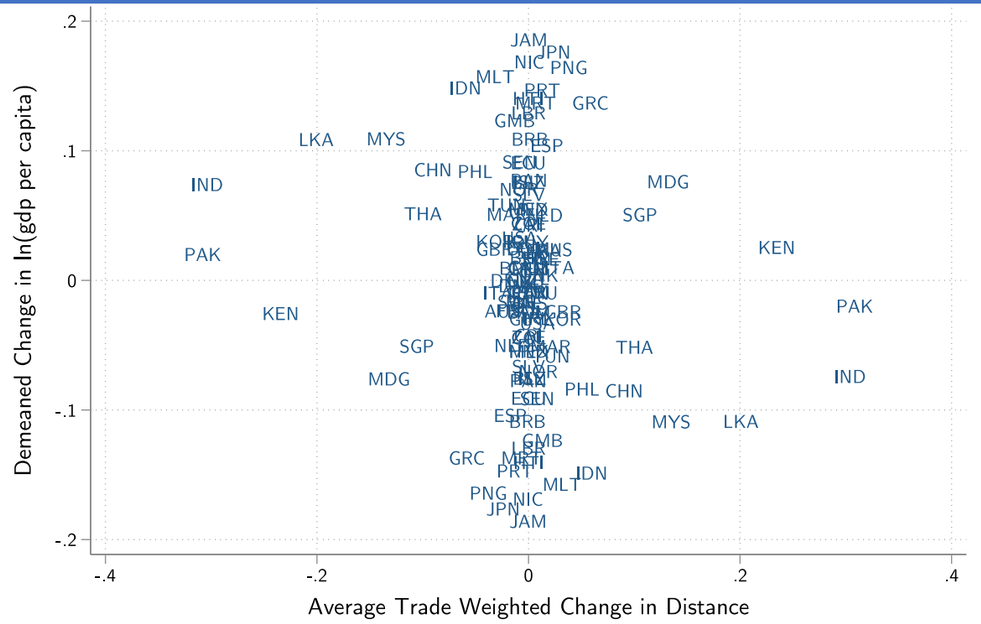
- 25 years ago, best answer was Frankel-Romer (1999) – but later criticized by e.g. Rodrik and Rodriguez (2000). Revisited by J. Feyrer…

Feyrer (2019)



- IV: suitability of location for air-based trade
- Elasticity of GDP p.c. to openness of 1.8-5.5

Feyrer (2021)



- IV: temporary closure of Suez Canal (1967-75)
- Elasticity of GDP p.c. to openness of 0.4-0.6

These effects are big

- In an undistorted economy, expect small aggregate gains from technological progress (here: in “shipping” sector)
  - Hulten (1978) to first-order approximation (and no terms-of-trade effects)
  - Arkolakis, Costinot & Rodriguez-Clare (2012): “ACR formula” exact for canonical gravity models

- Feyrer’s estimates seem much bigger than that
  - 4-25x larger than “ACR” level (Donaldson, 2015)
  - Adao, Costinot & Donaldson (2017) for non-gravity models: perhaps similar

- Intra-national analogs
  - Donaldson (2018) on India: effect of openness is 2x larger than ACR
  - Faber (2014) on China: apparent effect of openness is negative!

But what about distorted economies?

- Classic theme: Bhagwati, Dixit, Krueger, ...

- Standard result (for SOE and if "L" is the only factor):

$$\frac{dW}{d\text{Trade}} - \text{“Hulten”} = \mathbb{C}\text{ov}\left(VMPL_i, \frac{dL_i}{d\text{Trade}}\right)$$

$$VMPL_i \equiv \frac{\partial W}{\partial Q_i}\frac{\partial Q_i}{\partial L_i}$$

(and set of "i" includes all goods/services in economy)

- So effect of trade could be big if this $\mathbb{C}\text{ov}(\cdot) >> 0$

- But why would openness happen to move L *towards* high $VMPL_i$ activities?

What do we know about $\mathbb{C}\text{ov}\left(VMPL_i, \frac{dL_i}{d\text{Trade}}\right)$?

- My opinion: unfortunately, not a lot!

- Not surprising:
  - Measuring each causal effect $\frac{dL_i}{d\text{Trade}}$ is hard
  - Measuring $VMPL_i$ is harder
  - Measuring $\mathbb{C}\text{ov}\left(VMPL_i, \frac{dL_i}{d\text{Trade}}\right)$ is even harder

- Tons of synergies with rest of micro-Development
  - Diagnosing market failures and measuring "VMPLs" is a core endeavor (e.g. "input drop" experiments like de Mel, McKenzie & Woodruff, 2009)
  - Atkin & Khandelwal (2020) and Atkin & Donaldson (2022) sketch some of the possibilities

Progress on understanding $\mathbb{C}\text{ov}\left(VMPL_i, \frac{dL_i}{d\text{Trade}}\right)$

Informality

- Expect higher taxes (i.e. higher VMPL) in formal activities. So if openness expands formal activities then Cov(.)>0
- e.g. McCaig & Pavcnik (2018), Dix-Carneiro, Goldberg, Meghir & Ulyssea (2021)

Knowledge spillovers

- Cov(.)>0 when producers of underpriced knowledge expand
- Cross-country: e.g. Atkin, Khandelwal, & Osman (2017), Atkin, Costinot & Fukui (2022)
- Cross-industry: e.g. Faber & Gaubert (2019)

Size-dependent distortions

- Openness stretches the firm size distribution (Melitz, 2003). So

$$\mathbb{C}\text{ov}\left(VMPL_i, \frac{dL_i}{d\text{Trade}}\right) > 0 \iff \mathbb{C}\text{ov}\left(VMPL_i, L_i\right) > 0$$

- Market power: e.g. de Loecker, Goldberg, Khandelwal & Pavcnik (2016), Voigtlander & Garcia-Marin (2019), Felix (2022)

Technology adoption

- Followers may learn from adopters (Rodrik & Hausmann, 2003)
- Tariff reduction can cause more (e.g. Bustos, 2011) or less (e.g. Juhasz, 2018) adoption
- And other "adoption-like" behavior: e.g. Verhoogen (2023)

Production "internalities"

- Firm/agent may not even be *privately* optimizing
- "X-inefficiency": e.g. Pavcnik (2002)
- Myopic teenagers: e.g. Atkin (2016)

Some activities just "better"

- May have strong priors about VMPL being higher in some sectors
- e.g. goods that rich countries produce: Hausmann, Hwang & Rodrik (2007)
- e.g. heavy and chemical industries in South Korea: Lane (2023)

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Effects of Trade on Inequality

- Focus so far has been on “dW” of a hypothetical rep agent
- But for obvious reasons we care about effects on inequality (perhaps especially in places with little government redistribution or social protection)
- Classic topic (Heckscher-Ohlin, Stolper-Samuelson, etc.)
- Yet also long-standing puzzles (Goldberg and Pavcnik, 2007)

Trade and inequality: 4 mechanisms (+sign: )

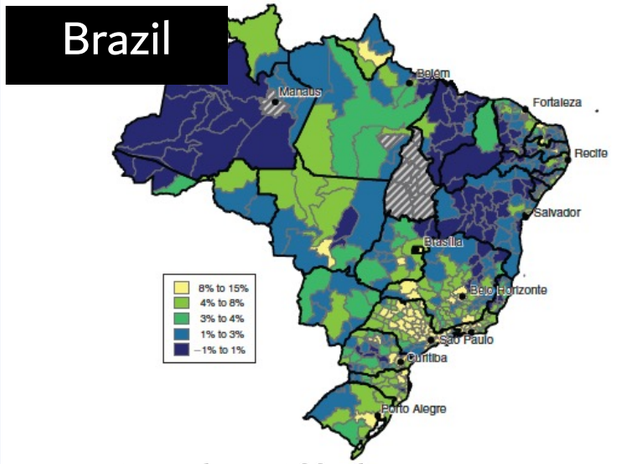
Import competition

- Home buyers substitute towards cheaper foreign goods
- Reduces demand for Home factors who are "linked" to the import-competing domestic goods

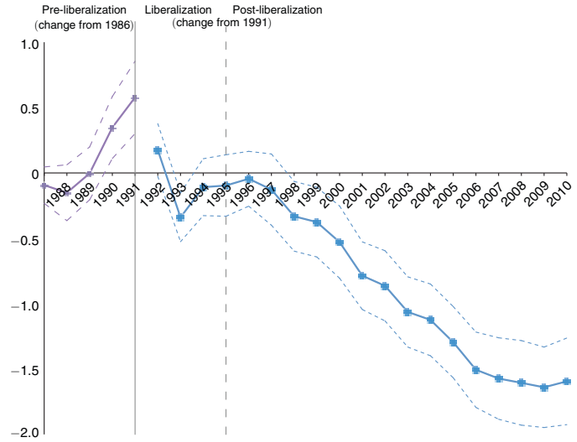
- e.g. Attanasio, Goldberg & Pavcnik (2004), Topalova (2010), Kovak (2013), Dix-Carneiro & Kovak (2017), ...

Import competition effects: some surprises

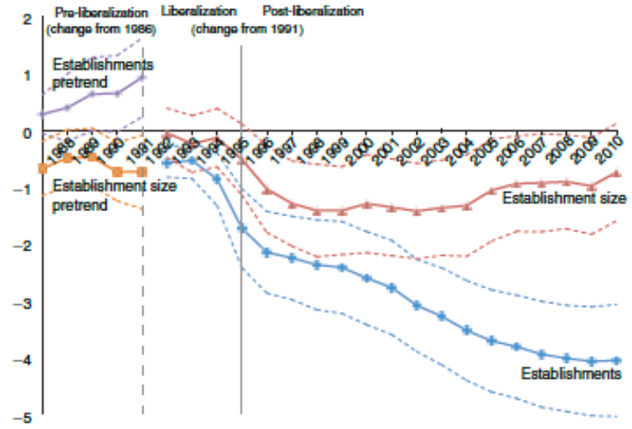
Dix-Carneiro & Kovak (2017)



Regional tariff change exposure (via import competition channel)



Effects on (formal sector) wages



Effects on (formal sector) firm exit

- Certainly not the Heckscher-Ohlin model I was taught in 2004...
- Also: wider social effects of such regional incidence (e.g. crime)
  - e.g. Dix-Carneiro, Soares & Ulyssea (2018), Dell, Feigenberg & Teshima (2019)
- Surveys in Muendler (2017) and Dix-Carneiro and Kovak (2023)

Trade and inequality: 4 mechanisms (+sign: )

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- e.g. Attanasio, Goldberg & Pavcnik (2004), Topalova (2010), Kovak (2013), Dix-Carneiro & Kovak (2017)

Export access

- Foreign buyers substitute toward cheaper Home goods
- Increases demand for Home factors who are "linked" to the newly export-oriented goods

- e.g. Verhoogen (2007), Demir, Fieler, Xu & Yang (2024)

Imported inputs

- Home firms use cheaper foreign inputs
- Increases demand for Home factors who are complements for those inputs
- Decreases demand for Home factors who are substitutes for them

- e.g. Burstein, Cravino & Vogel (2013), Fieler, Eslava & Xu (2018)

Consumer prices

- Home consumers enjoy increased purchasing power over avg. good
- When consumers have heterog. cons. mix (tastes, income, location), gains are borne unequally (+ losses possible for some)

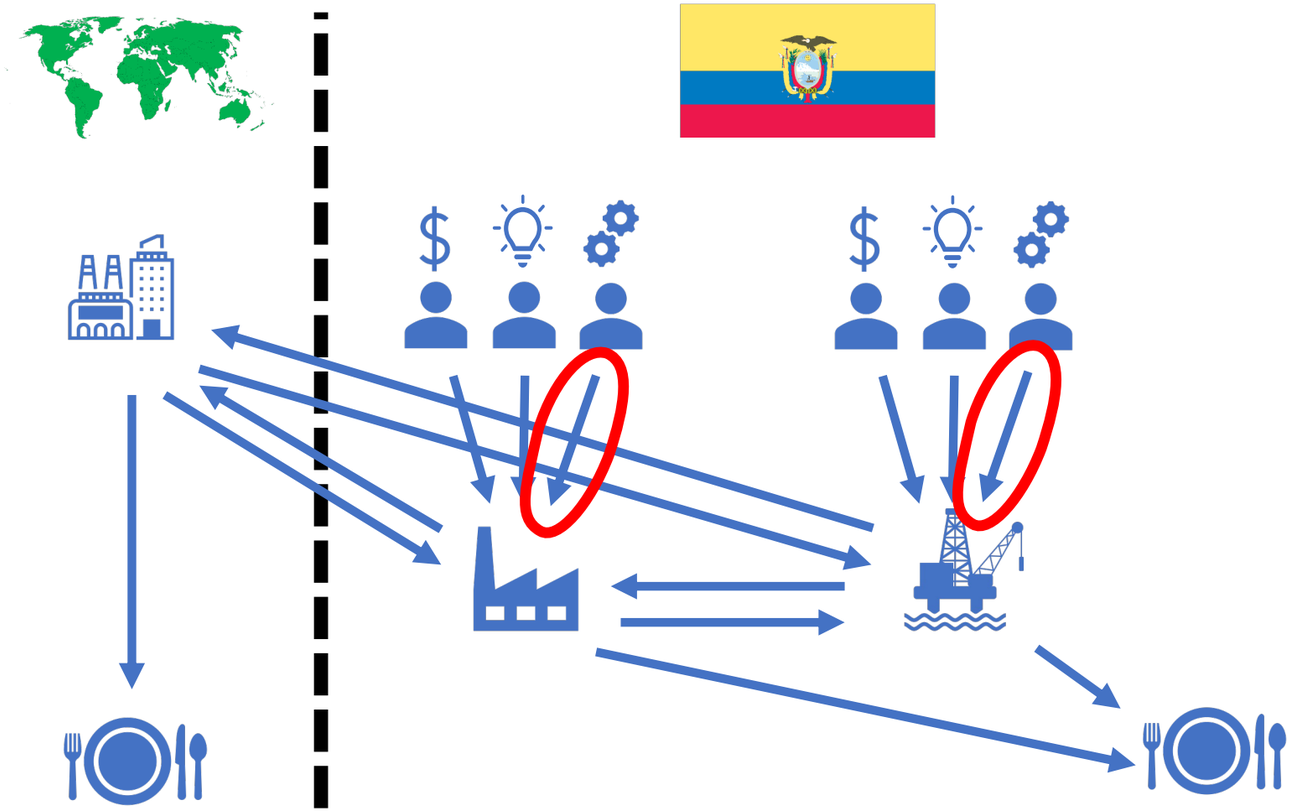
- e.g. Porto (2006), Faber (2014), Atkin & Donaldson (2015), Fajgelbaum & Khandelwal (2016)

...plus, the "indirect" versions of above 4 "direct" effects

- Supply chain linkages: e.g. law firm rarely exports, but if main client is an exporter they are an "indirect exporter"

Putting 3+ mechanisms together (earnings ineq.)

Adao, Carrillo, Costinot, Donaldson & Pomeranz (2022)



5 administrative datasets from Ecuador:

Employer-employee matched data (social security)

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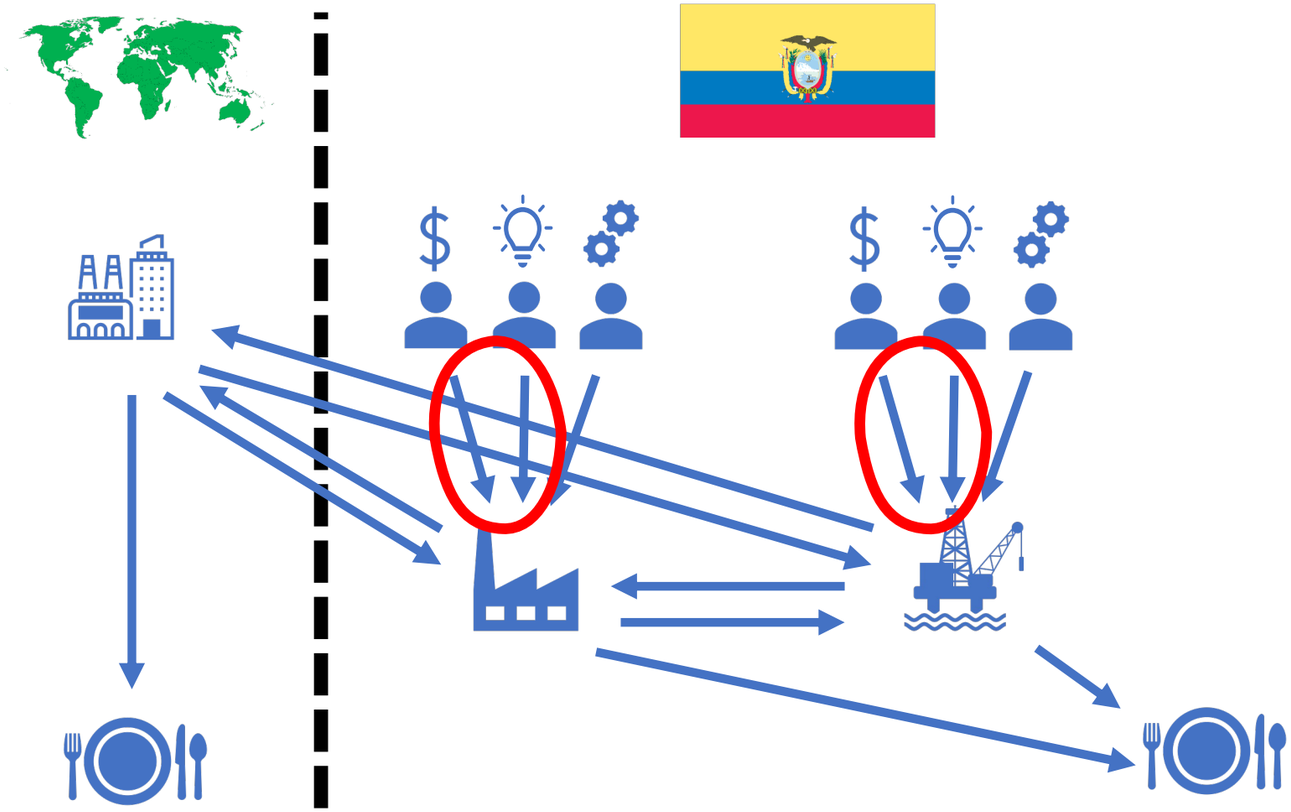

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Owner-firm matched data (ownership records)

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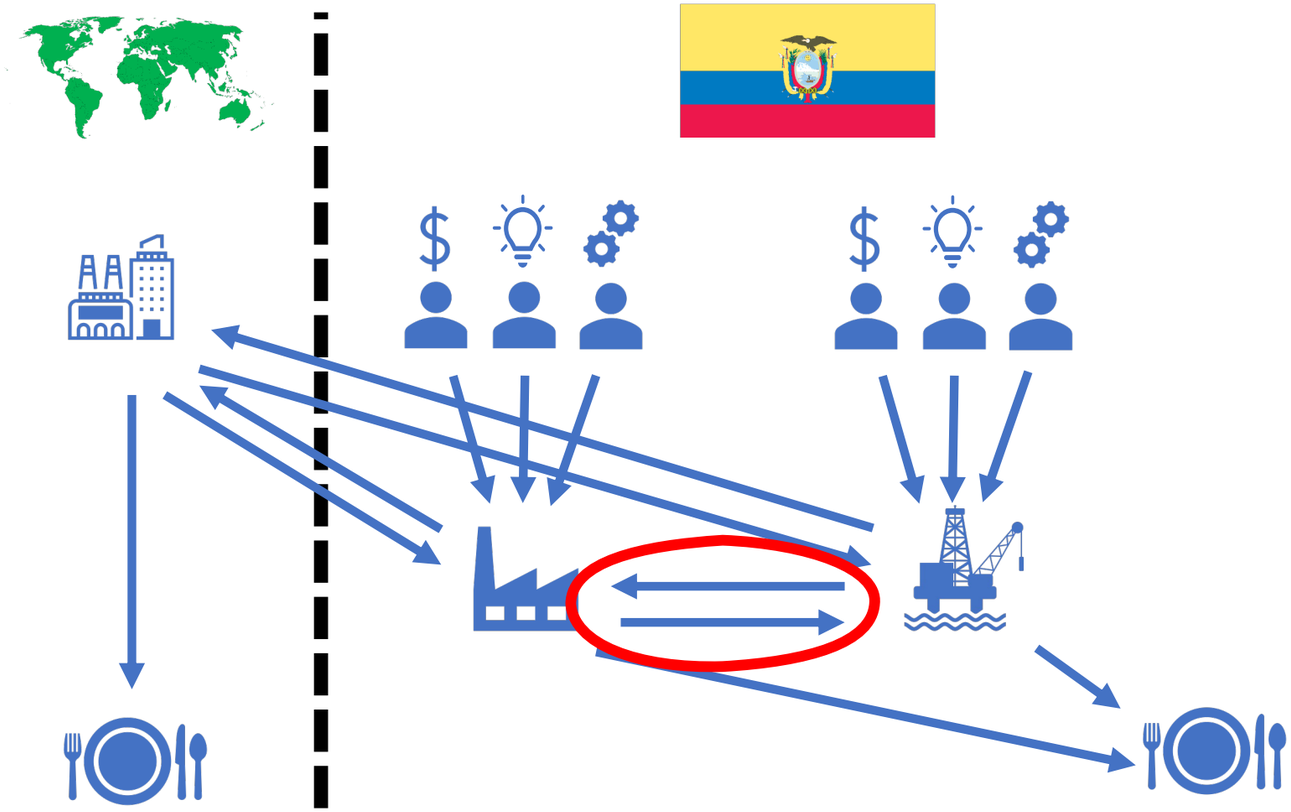


5 administrative datasets from Ecuador:

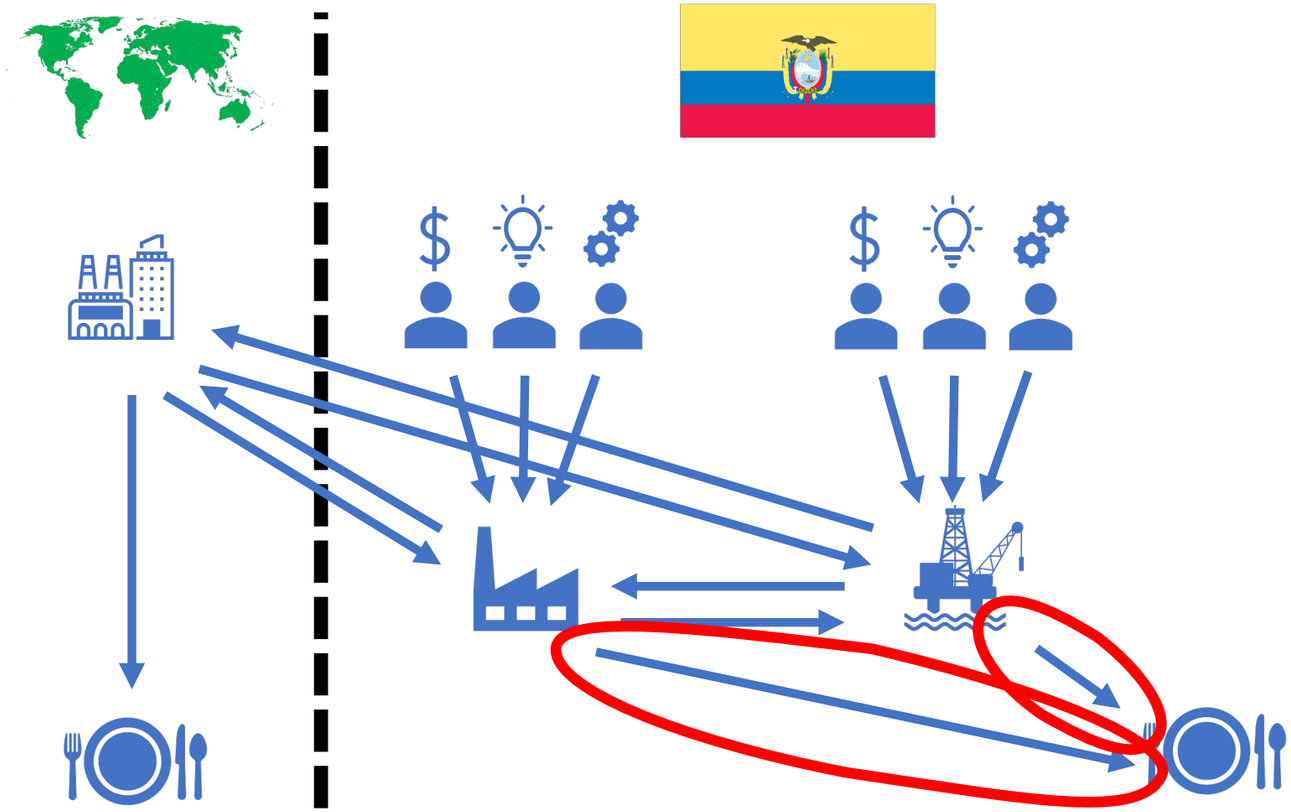
Employer-employee matched data (social security)

Owner-firm matched data (ownership records)

Firm-to-firm sales data (VAT records)

Putting 3+ mechanisms together (earnings ineq.)

Adao, Carrillo, Costinot, Donaldson & Pomeranz (2022)



5 administrative datasets from Ecuador:

Employer-employee matched data (social security)

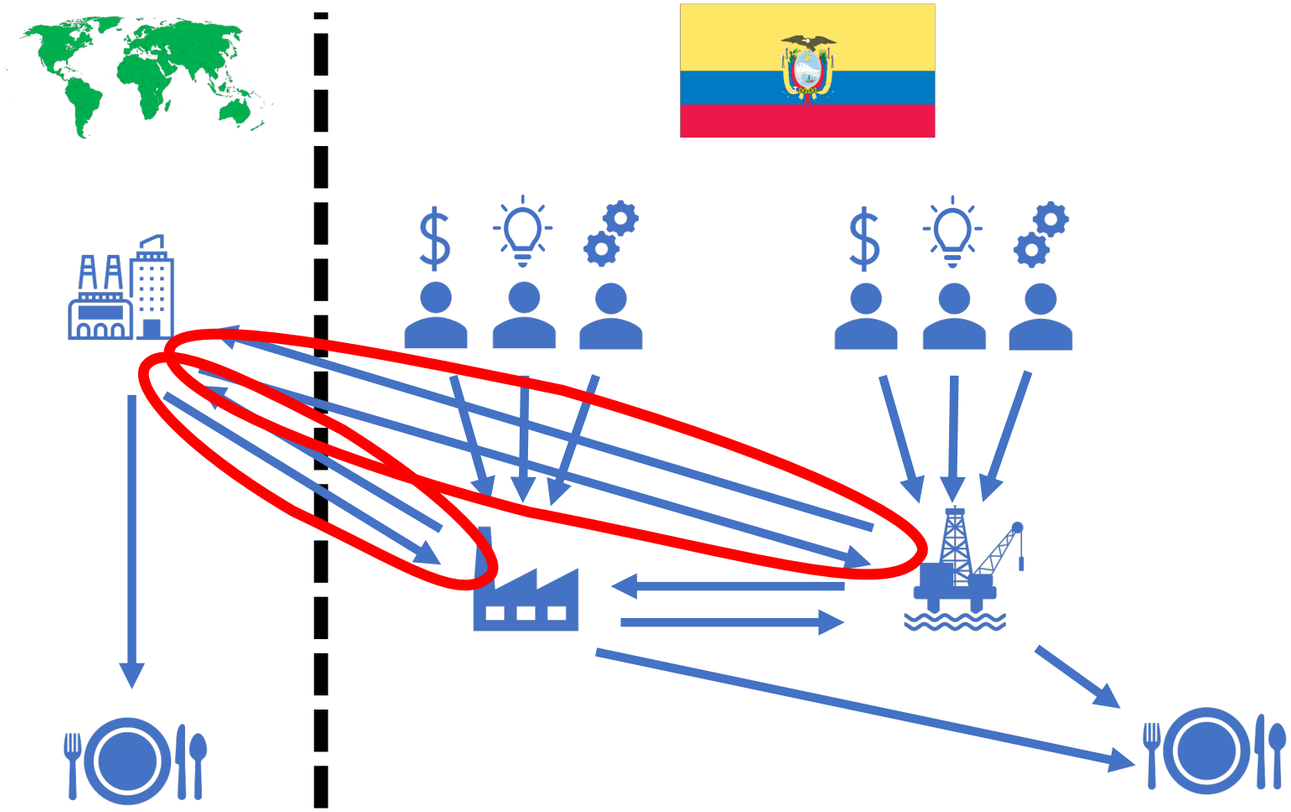
Owner-firm matched data (ownership records)

Firm-to-firm sales data (VAT records)

Firm-to-(rep.) consumer sales data (corp. tax)

Putting 3+ mechanisms together (earnings ineq.)

Adao, Carrillo, Costinot, Donaldson & Pomeranz (2022)



5 administrative datasets from Ecuador:

Employer-employee matched data (social security)

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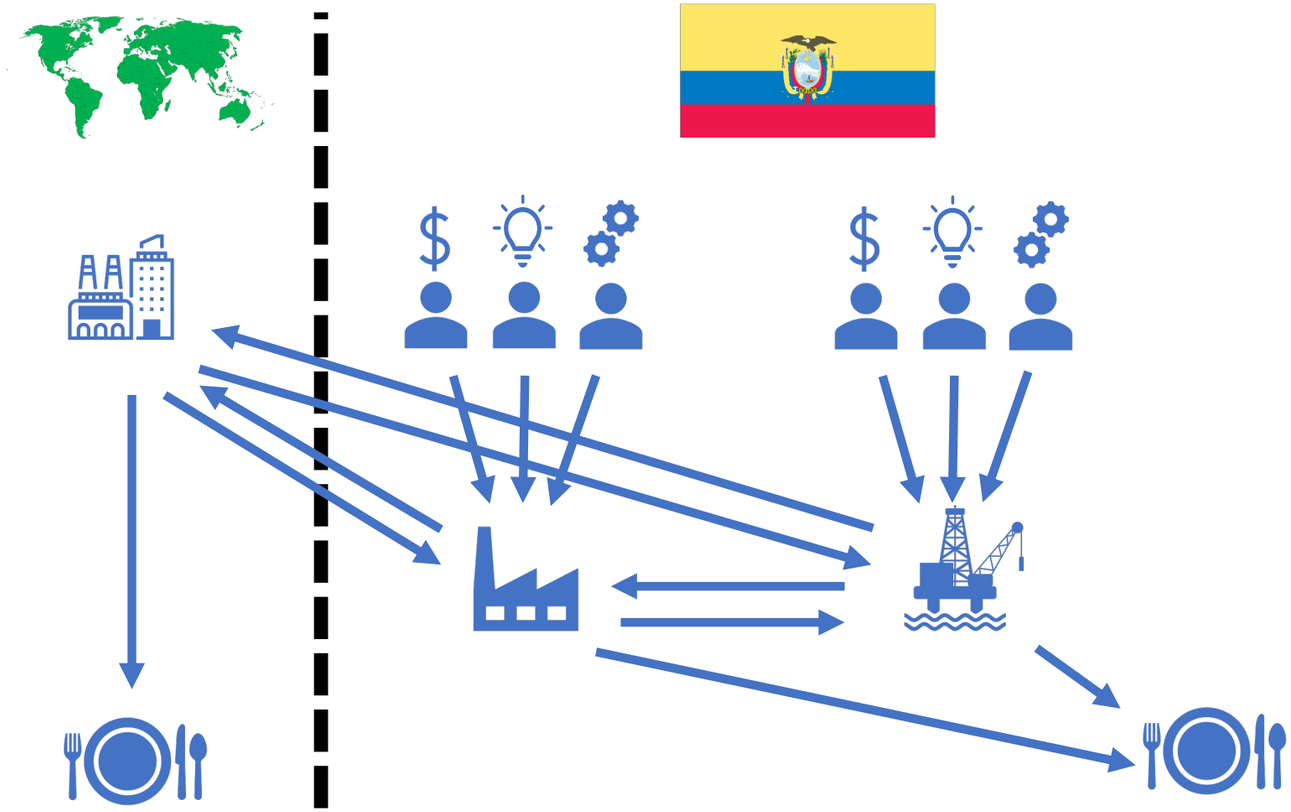
Firm-to-firm sales data (VAT records)

Firm-to-(rep.) consumer sales data (corp. tax)

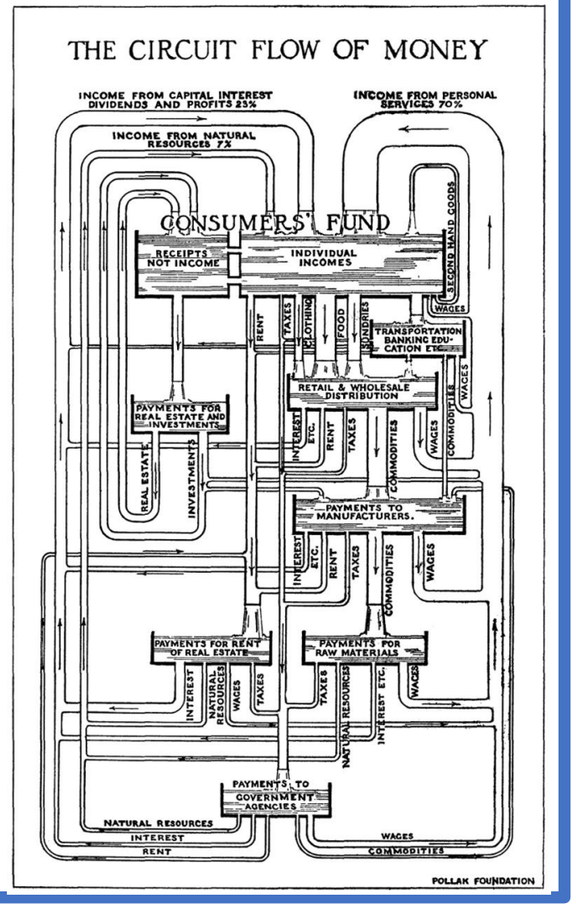
Firm-to/from-foreign (customs transactions)

Putting 3+ mechanisms together (earnings ineq.)

Adao, Carrillo, Costinot, Donaldson & Pomeranz (2022)

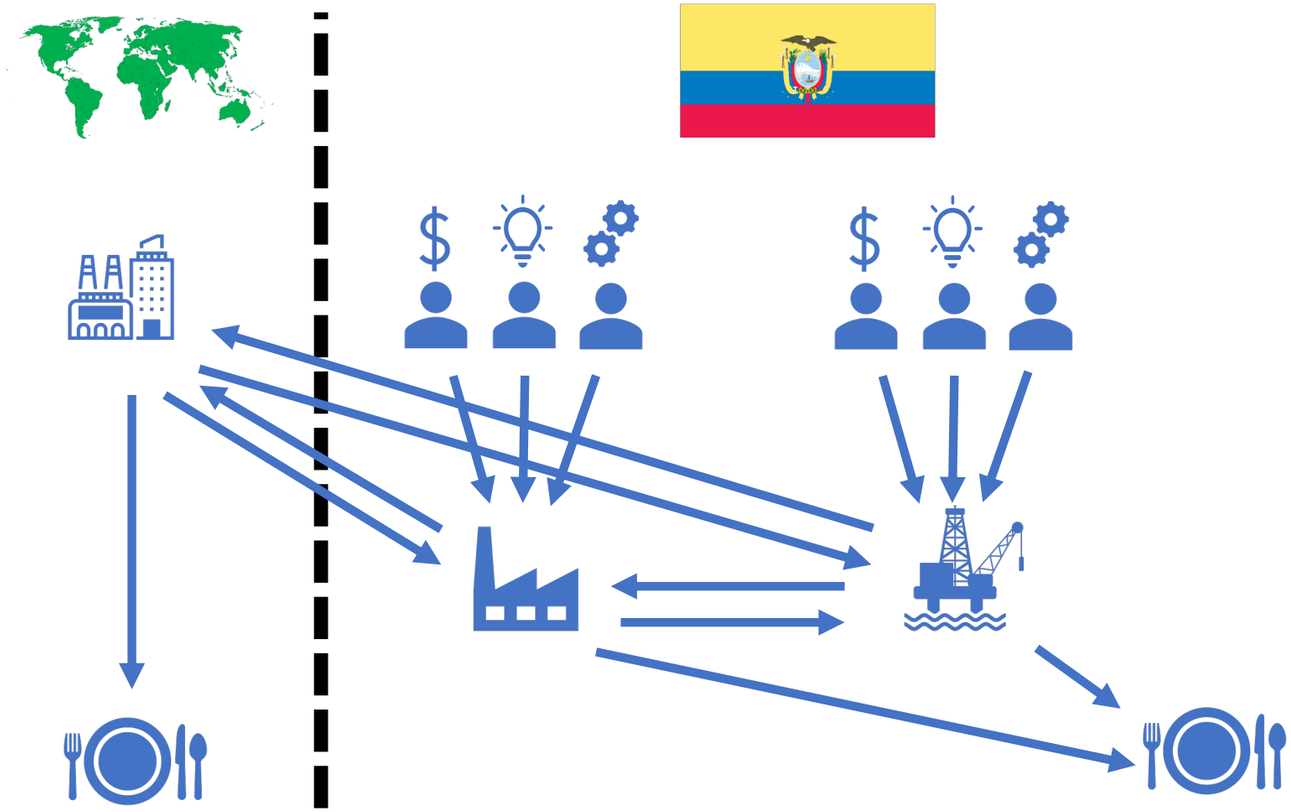


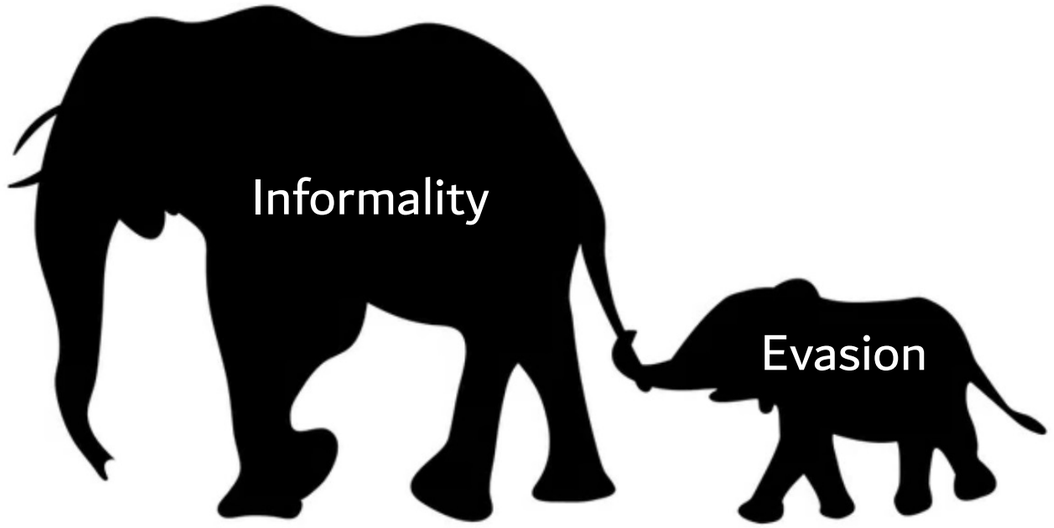
(We dream of Foster: *Am. Econ. Rev*, 1922....)



Putting 3+ mechanisms together (earnings ineq.)

Adao, Carrillo, Costinot, Donaldson & Pomeranz (2022)





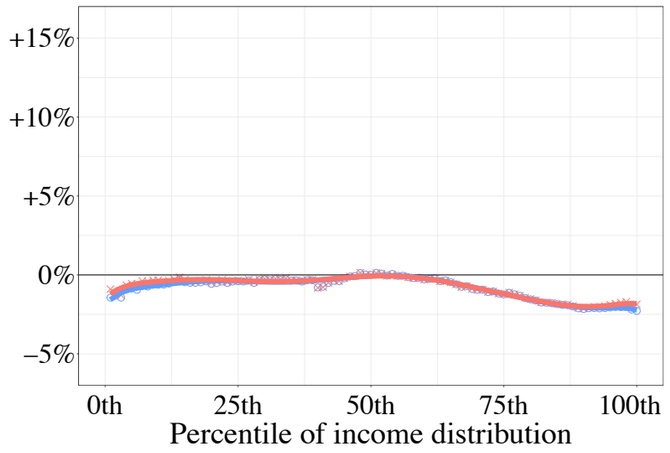
(See paper re: informality, and Carrillo, Donaldson, Pomeranz & Singhal (2023) re: evasion)

Putting 3+ mechanisms together (earnings ineq.)

Adao, Carrillo, Costinot, Donaldson & Pomeranz (2022)

Ecuador

Impact of trade via export exposure



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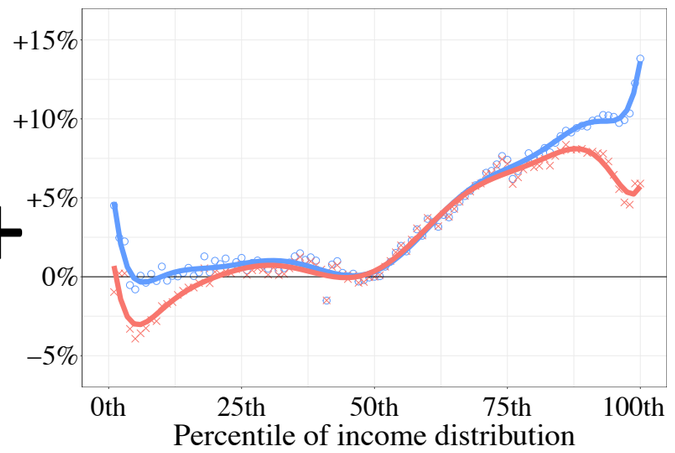
Impact of trade via import exposure (combo. of import competition and imported inputs)



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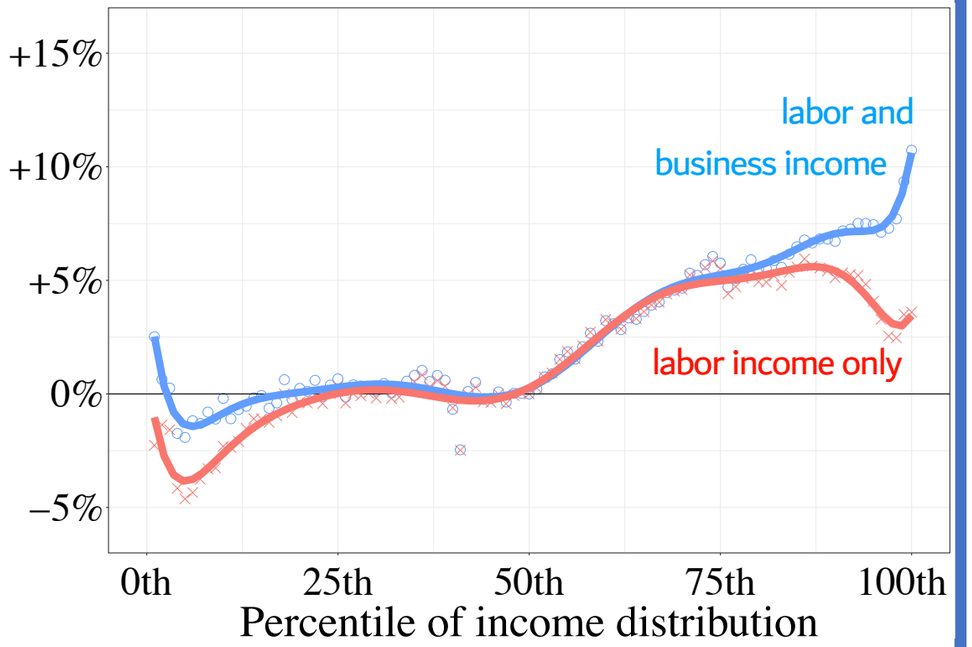
Total impact of trade



- We estimate that Trade here is relatively pro-rich, mostly because of imports, and mostly because of firms that benefit from imported inputs

3 areas of rapid progress in past 20 years

1. **Broadening what we mean by "Trade"**
   - *Intra-national as well as inter-national*

2. **Effects of Trade on aggregate income**
   - *Seem large – achieved through reduced misallocation?*

3. **Effects of Trade on inequality**
   - *Large spatial frictions can really change picture of incidence*

Important omissions

- **Other international channels (often tied with Trade):**
  - FDI, multinationals, global supply chains

- **Trade and the environment, for developing country settings:**
  - Can intra- and inter-national trade smooth out environmental shocks?
  - Trade as leakage (intra- and inter-nationally)
  - Trade agreements as means to support climate agreements
  - Border adjustment mechanisms, etc.

- **Trade and wider social concerns: discrimination, human rights, fair trade**

- **Trade and political economy:**
  - Effects of openness on domestic institutions
  - Is trade policy more susceptible to lobbying + corruption than other policy areas?

- **Contracting frictions as barriers to international trade**

See recent surveys: Goldberg and Pavcnik (2016), Atkin and Khandelwal (2020), Atkin and Donaldson (2022), VoxDevLit (2022)

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